AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-23. (Canceled)

24. (Previously Presented) A method of operating a solid fuel fired boiler, comprising:

introducing a solid fuel into at least one of a slag-type furnace and a wet-bottom boiler;

introducing an iron-bearing material into the at least one of a slag-type furnace and a wet-bottom boiler, wherein the iron bearing material is at least one of mill scale from steel production and dust from blast furnace gas cleaning equipment; and

at least partially combusting the solid fuel to produce an ash slag, wherein, in the at least partially combusting step, at least one of the following is true:

(i) at least a portion of the iron bearing material fluxes the ash slag to produce a composite ash slag having at least one ash fusion temperature characteristic selected from the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature less than the same ash fusion temperature characteristic of the ash slag produced from combustion of the solid fuel alone; and

(ii) at least a portion of the iron bearing material fluxes the ash slag to produce a composite ash slag having a melting point less than the melting point of ash slag produced from the combustion of the solid fuel alone.

25. (Original) The method of claim 24, wherein the ash slag has a viscosity during the at least partially combusting step that is less than the viscosity of a second ash slag produced from combustion of the solid fuel alone.

26. (Original) The method of claim 24, wherein the ash slag has a melting point during the at least partially combusting step that is less than the melting point of a second ash slag produced from combustion of the solid fuel alone.

27-32. (Canceled)

33. (Original) The method of claim 24, wherein at least a portion of the iron bearing material fluxes the ash slag to produce a composite ash slag having at least one characteristic selected from the group consisting of viscosity and melting temperature less than the same characteristic of ash slag produced from combustion of the solid fuel alone.

34. (Original) The method of claim 25, wherein a T_{250} temperature at which the ash has a viscosity of 250 poise produced from the combustion of the solid fuel and iron-bearing material is at least 100 degrees Fahrenheit lower than the T_{250} temperature produced from the combustion of the solid fuel alone.

35. (Original) The method of claim 25, wherein the solid fuel is coal and the coal has a sulfur content of less than about 1.5 wt.% (dry basis of the coal).

36. (Original) The method of claim 24, wherein the melting point of the composite ash slag is less than 2600 degrees F.

37-43. (Canceled)

44. (Previously Presented) The method of claim 24, wherein (i) is true.

45. (Previously Presented) The method of claim 24, wherein the at least one ash fusion temperature characteristic is fluid temperature.

46. (Previously Presented) The method of claim 24, wherein step (ii) is true.

47. (Previously Presented) The method of claim 24, wherein the solid fuel is introduced into a wet-bottom boiler.

48. (Previously Presented) The method of claim 24, wherein the solid fuel comprises a sub-bituminous coal.

49. (Previously Presented) The method of claim 24, wherein the boiler is for at least one of steam production and electricity generation and wherein the iron-bearing material has a P_{90} size of no more than about 300 microns.

50. (Previously Presented) The method of claim 24, wherein the at least one of a slag-type furnace and a wet-bottom boiler is a cyclone boiler.

51. (Previously Presented) The method of claim 24, wherein the composite ash slag has a viscosity such that the composite ash slag flows from the at least one of a slag-type furnace and a wet-bottom boiler.

52. (Previously Presented) The method of claim 50, further comprising pulverizing the solid fuel prior to introducing the solid fuel into the boiler.

53. (Previously Presented) The method of claim 24, wherein the iron-bearing material is mill scale from steel production.

54. (Previously Presented) The method of claim 24, wherein the iron-bearing material is dust from blast furnace gas cleaning equipment.

55. (Previously Presented) The method of claim 24, wherein the iron-bearing material comprises at least one of ferrous oxide and ferric iron oxide.

56. (Previously Presented) The method of claim 24, wherein the iron-bearing material comprises magnetite.

57. (Previously Presented) The method of claim 24, wherein the iron-bearing material comprises at least one carbon compound.

58. (Previously Presented) The method of claim 24, further comprising introducing at least one carbon compound along with the iron-bearing material, the at least one carbon compound promoting the reduction of iron oxides and the at least one carbon compound being one or more of a hydrocarbon, oil, grease, and xanthan gum.

59. (Previously Presented) The method of claim 24, wherein the at least one of a slag-type furnace and a wet-bottom boiler comprises:

a pulverizer, wherein the solid fuel is fed to the pulverizer;

a burner;

a fuel transfer system communicating with the pulverizer and the burner; and

a combustion chamber comprising an enclosure at least partially surrounding the burner and further comprising:

introducing the iron-bearing material into at least one of the fuel storage bunker, the fuel transfer system, the cyclone burner, and the combustion chamber.

60. (Previously Presented) The method of claim 50, wherein the cyclone boiler comprises:

a fuel storage bunker;

a cyclone burner;

a fuel transfer system communicating with the fuel storage bunker and the cyclone burner; and

a combustion chamber comprising an enclosure at least partially surrounding the burners.

61. (Previously Presented) The method of claim 24, wherein the iron-bearing material is introduced into the boiler in an amount ranging from about 10 lb/ton of solid fuel to about 50 lb/ton of solid fuel.

62. (Previously Presented) The method of claim 24, wherein the ash slag has a total iron concentration of at least about 15 weight percent.

63. (Previously Presented) The method of claim 50, wherein the iron-bearing material is added to the solid fuel before introducing the solid fuel and the iron-bearing material into the boiler.

64. (Previously Presented) The method of claim 50, wherein the composite ash slag has a viscosity in the boiler less than the viscosity in the boiler of the ash slag produced from the combustion of the solid fuel alone.

65. (Previously Presented) The method of claim 24, wherein the iron-bearing material is selected from the group consisting of ferrous oxide, ferric oxide, ferrous sulfide, ferric sulfide, and combinations thereof.

66. (Currently Amended) The method of claim 44, wherein the at least one ash fusion temperature <u>characteristic</u> is less than 2600°F.

67. (Previously Presented) The method of claim 24, wherein the solid fuel is a coal having a sulfur content based on a dry basis of the coal of less than about 1.5 wt.%.

68. (Previously Presented) A method of operating a solid fuel fired boiler, comprising:

introducing a solid fuel into a wet-bottom boiler;

introducing an iron-bearing material into the wet-bottom boiler, wherein the iron-bearing material is at least one of mill scale from steel production and dust from blast furnace gas cleaning equipment; and

at least partially combusting the solid fuel to produce an ash slag, wherein at least a portion of the iron-bearing material fluxes the ash slag to produce a composite ash slag having a melting temperature less than the melting temperature of ash slag produced from the combustion of the solid fuel alone.

69. (Previously Presented) The method of claim 68, wherein the solid fuel comprises a sub-bituminous coal.

70. (Previously Presented) The method of claim 68, wherein the boiler is for at least one of steam production and electricity generation and wherein the iron-bearing material has a P_{90} size of no more than about 300 microns.

71. (Previously Presented) The method of claim 68, wherein the boiler is a cyclone boiler.

72. (Previously Presented) The method of claim 68, wherein the composite ash slag has a viscosity such that the composite ash slag flows from the wet-bottom boiler.

73. (Previously Presented) The method of claim 68, further comprising pulverizing the solid fuel prior to introducing the solid fuel into the boiler.

74. (Previously Presented) The method of claim 68, wherein the iron-bearing material is mill scale from steel production.

75. (Previously Presented) The method of claim 68, wherein the iron-bearing material is dust from blast furnace gas cleaning equipment.

76. (Previously Presented) The method of claim 68, wherein the iron-bearing material comprises at least one of ferrous oxide and ferric iron oxide.

77. (Previously Presented) The method of claim 68, wherein the iron-bearing material comprises magnetite.

78. (Previously Presented) The method of claim 68, wherein the iron-bearing material comprises at least one carbon compound.

79. (Previously Presented) The method of claim 68, further comprising introducing at least one carbon compound along with the iron-bearing material, the at least one carbon compound promoting the reduction of iron oxides and the at least one carbon compound being one or more of a hydrocarbon, oil, grease, and xanthan gum.

80. (Previously Presented) The method of claim 68, wherein the wet-bottom boiler comprises:

a pulverizer, wherein the solid fuel is fed to the pulverizer;

a burner;

a fuel transfer system communicating with the pulverizer and the burner; and

a combustion chamber comprising an enclosure at least partially surrounding the burner and further comprising:

introducing the iron-bearing material into at least one of the fuel storage bunker, the fuel transfer system, the cyclone burner, and the combustion chamber.

81. (Previously Presented) The method of claim 71, wherein the cyclone boiler comprises:

a fuel storage bunker;

a cyclone burner;

a fuel transfer system communicating with the fuel storage bunker and the cyclone burner; and

a combustion chamber comprising an enclosure at least partially surrounding the burners.

82. (Previously Presented) The method of claim 68, wherein the iron-bearing material is introduced into the boiler in an amount ranging from about 10 lb/ton of solid fuel to about 20 lb/ton of solid fuel.

83. (Previously Presented) The method of claim 68, wherein the ash slag has a total iron concentration of at least about 15 weight percent.

84. (Previously Presented) The method of claim 68, wherein the iron-bearing material is added to the solid fuel before introducing the solid fuel and the iron-bearing material into the boiler.

85. (Previously Presented) The method of claim 68, wherein the composite ash slag has a viscosity in the boiler less than the viscosity in the boiler of the ash slag produced from the combustion of the solid fuel alone.

86. (Previously Presented) The method of claim 68, wherein the iron-bearing material is selected from the group consisting of ferrous oxide, ferric oxide, ferrous sulfide, ferric sulfide, and combinations thereof.

87. (Previously Presented) The method of claim 68, wherein, in the at least partially combusting step, at least one ash fusion temperature characteristic selected from the

group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature of the composite ash slag is less than the same ash fusion temperature characteristic of the ash slag produced from combustion of the solid fuel alone.

88. (Currently Amended) The method of claim 87, wherein the at least one ash fusion temperature <u>characteristic</u> is less than 2600°F.

89. (Previously Presented) The method of claim 46, wherein the solid fuel is a coal having a sulfur content based on a dry basis of the coal of less than about 1.5 wt.%.

90. (Previously Presented) A method of operating a solid fuel fired boiler, comprising:

introducing a solid fuel into a wet-bottom boiler;

introducing an iron-bearing material into the wet-bottom boiler, wherein the iron-bearing material is at least one of mill scale from steel production and dust from blast furnace gas cleaning equipment; and

at least partially combusting the solid fuel to produce an ash slag, wherein at least a portion of the iron-bearing material fluxes the ash slag to produce a composite ash slag having a viscosity in the boiler less than the viscosity in the boiler of an ash slag produced from the combustion of the solid fuel alone.

91. (Previously Presented) The method of claim 90, wherein the solid fuel comprises a sub-bituminous coal.

92. (Previously Presented) The method of claim 90, wherein the boiler is for at least one of steam production and electricity generation and wherein the iron-bearing material has a P_{90} size of no more than about 300 microns.

93. (Previously Presented) The method of claim 90, wherein the boiler is a cyclone boiler.

94. (Previously Presented) The method of claim 90, wherein the composite ash slag has a viscosity such that the composite ash slag flows from the wet-bottom boiler.

95. (Previously Presented) The method of claim 90, further comprising pulverizing the solid fuel prior to introducing the solid fuel into the boiler.

96. (Previously Presented) The method of claim 90, wherein the iron-bearing material is mill scale from steel production.

97. (Previously Presented) The method of claim 90, wherein the iron-bearing material is dust from blast furnace gas cleaning equipment.

98. (Previously Presented) The method of claim 90, wherein the iron-bearing material comprises at least one of ferrous oxide and ferric iron oxide.

99. (Previously Presented) The method of claim 90, wherein the iron-bearing material comprises magnetite.

100. (Previously Presented) The method of claim 90, wherein the iron-bearing material comprises at least one carbon compound.

101. (Previously Presented) The method of claim 90, further comprising introducing at least one carbon compound along with the iron-bearing material, , the at least one carbon compound promoting the reduction of iron oxides and the at least one carbon compound being one or more of a hydrocarbon, oil, grease, and xanthan gum.

102. (Previously Presented) The method of claim 90, wherein the wet-bottom boiler comprises:

a pulverizer, wherein the solid fuel is fed to the pulverizer;

a burner;

a fuel transfer system communicating with the pulverizer and the burner; and

a combustion chamber comprising an enclosure at least partially surrounding the burner and further comprising:

introducing the iron-bearing material into at least one of the fuel storage bunker, the fuel transfer system, the cyclone burner, and the combustion chamber.

103. (Previously Presented) The method of claim 93, wherein the cyclone boiler comprises:

a fuel storage bunker;

a cyclone burner;

a fuel transfer system communicating with the fuel storage bunker and the cyclone burner; and

a combustion chamber comprising an enclosure at least partially surrounding the burners.

104. (Previously Presented) The method of claim 90, wherein the iron-bearing material is introduced into the boiler in an amount ranging from about 10 lb/ton of solid fuel to about 50 lb/ton of solid fuel.

105. (Previously Presented) The method of claim 90, wherein the ash slag has a total iron concentration of at least about 15 weight percent.

106. (Previously Presented) The method of claim 90, wherein the iron-bearing material is added to the solid fuel before introducing the solid fuel and the iron-bearing material into the boiler.

107. (Previously Presented) The method of claim 90, wherein the composite ash slag has a melting temperature less than the melting temperature of the ash slag produced from the combustion of the solid fuel alone.

108. (Previously Presented) The method of claim 90, wherein the iron-bearing material is selected from the group consisting of ferrous oxide, ferric oxide, ferrous sulfide, ferric sulfide, and combinations thereof.

109. (Previously Presented) The method of claim 90, wherein, in the at least partially combusting step, at least one ash fusion temperature characteristic selected from the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature of the composite ash slag is less than the same ash fusion temperature characteristic of the ash slag produced from combustion of the solid fuel alone.

110. (Currently Amended) The method of claim 109, wherein the at least one ash fusion temperature <u>characteristic</u> is less than 2600°F.

111. (Previously Presented) The method of claim 90, wherein the solid fuel is a coal having a sulfur content based on a dry basis of the coal of less than about 1.5 wt.%.

112. (Previously Presented) A method of operating a solid fuel fired boiler, comprising:

introducing a solid fuel into a wet-bottom boiler;

introducing an iron-bearing material into the wet-bottom boiler, wherein the iron-bearing material comprises iron oxides; and

at least partially combusting the solid fuel to produce an ash slag, wherein at least a portion of the iron-bearing material fluxes the ash slag to produce a composite ash slag having a viscosity less than a viscosity of ash slag produced from the combustion of the solid fuel alone.

113. (Previously Presented) The method of claim 112, wherein the solid fuel comprises a sub-bituminous coal.

114. (Previously Presented) The method of claim 112, wherein the boiler is for at least one of steam production and electricity generation and wherein the iron-bearing material has a P_{90} size of no more than about 300 microns.

115. (Previously Presented) The method of claim 112, wherein the boiler is a cyclone boiler.

116. (Previously Presented) The method of claim 112, wherein the composite ash slag has a viscosity such that the composite ash slag flows from the wet-bottom boiler.

117. (Previously Presented) The method of claim 112, further comprising pulverizing the solid fuel prior to introducing the solid fuel into the boiler.

118. (Previously Presented) The method of claim 112, wherein the iron-bearing material is mill scale from steel production.

119. (Previously Presented) The method of claim 112, wherein the iron-bearing material is dust from blast furnace gas cleaning equipment.

120. (Previously Presented) The method of claim 112, wherein the iron-bearing material comprises at least one of ferrous oxide and ferric iron oxide.

121. (Previously Presented) The method of claim 112, wherein the iron-bearing material comprises magnetite.

122. (Previously Presented) The method of claim 112, wherein the iron-bearing material comprises at least one carbon compound.

123. (Previously Presented) The method of claim 112, further comprising introducing at least one carbon compound along with the iron-bearing material, the at least one carbon compound promoting the reduction of iron oxides and the at least one carbon compound being one or more of a hydrocarbon, oil, grease, and xanthan gum.

124. (Previously Presented) The method of claim 112, wherein the wet-bottom boiler comprises:

a pulverizer, wherein the solid fuel is fed to the pulverizer;

a burner;

a fuel transfer system communicating with the pulverizer and the burner; and

a combustion chamber comprising an enclosure at least partially surrounding the burner and further comprising:

introducing the iron-bearing material into at least one of the fuel storage bunker, the fuel transfer system, the cyclone burner, and the combustion chamber.

125. (Previously Presented) The method of claim 115, wherein the cyclone boiler comprises:

a fuel storage bunker;

a cyclone burner;

a fuel transfer system communicating with the fuel storage bunker and the cyclone burner; and

a combustion chamber comprising an enclosure at least partially surrounding the burners.

126. (Previously Presented) The method of claim 112, wherein the iron-bearing material is introduced into the boiler in an amount ranging from about 10 lb/ton of solid fuel to about 20 lb/ton of solid fuel.

127. (Previously Presented) The method of claim 112, wherein the ash slag has a total iron concentration of at least about 15 weight percent.

128. (Previously Presented) The method of claim 112, wherein the iron-bearing material is added to the solid fuel before introducing the solid fuel and the iron-bearing material into the boiler.

129. (Previously Presented) The method of claim 112, wherein the composite ash slag has a melting point in the boiler less than the melting point in the boiler of the ash slag produced from the combustion of the solid fuel alone.

130. (Previously Presented) The method of claim 112, wherein the iron-bearing material is selected from the group consisting of ferrous oxide, ferric oxide, ferrous sulfide, ferric sulfide, and combinations thereof.

131. (Previously Presented) The method of claim 112, wherein, in the at least partially combusting step, at least one ash fusion temperature characteristic selected from the group consisting of initial deformation temperature, softening temperature, hemispherical temperature, and fluid temperature of the composite ash slag is less than the same ash fusion temperature characteristic of the ash slag produced from combustion of the solid fuel alone.

132. (Currently Amended) The method of claim 131, wherein the at least one ash fusion temperature <u>characteristic</u> is less than 2600°F.

133. (Previously Presented) The method of claim 112, wherein the solid fuel is a coal having a sulfur content based on a dry basis of the coal of less than about 1.5 wt.%.

134. (New) A method for operating a slag type furnace, comprising:

introducing a coal-containing fuel into said slag type furnace;

introducing an iron-containing additive into the slag type furnace in an amount sufficient to flux the coal-containing fuel; and

melting at least a portion of the coal-containing fuel to produce an ash slag, wherein, in the melting step, at least a portion of the iron-containing additive fluxes the ash slag to produce a slag layer having a melting point less than a melting point of an slag layer without the iron-containing additive.

135. (New) The method of claim 134, wherein at least about 33.5% of the iron-containing additive is in the form of ferrous iron and no more than about 66.5% of the iron in the additive is in the form of ferric iron.

136. (New) The method of claim 134, wherein the additive is in the form of a free-flowing particulate having a P_{90} size of no more than about 300 microns.

137. (New) The method of claim 1, wherein the additive comprises one or more of mill scale fines and particles removed by particulate collection systems from one or more of offgases of steel manufacturing and offgases from iron manufacturing.